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| APPLICATION NO.         | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-------------------------|-------------|----------------------|---------------------|------------------|
| 10/798,310              | 03/12/2004  | Hidayat Husain       | 4320-553            | 5768             |
| 1059                    | 7590        | 11/16/2005           | EXAMINER            |                  |
|                         |             |                      | FORTUNA, ANA M      |                  |
|                         |             | ART UNIT             |                     | PAPER NUMBER     |
|                         |             | 1723                 |                     |                  |
| DATE MAILED: 11/16/2005 |             |                      |                     |                  |

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                        |                     |  |
|------------------------------|------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                              | 10/798,310             | HUSAIN ET AL.       |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                              | Ana M. Fortuna         | 1723                |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 31 August 2005.

2a) This action is FINAL.                    2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 1-22 and 38-58 is/are pending in the application.

4a) Of the above claim(s) 23-37 is/are withdrawn from consideration.

5) Claim(s) \_\_\_\_\_ is/are allowed.

6) Claim(s) 1-22, 38-58 is/are rejected.

7) Claim(s) \_\_\_\_\_ is/are objected to.

8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All    b) Some \* c) None of:

1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

|  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                     | Paper No(s)/Mail Date. _____ .  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ . | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
|  | 6) <input type="checkbox"/> Other: _____ .                                  |

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-6, 17, 18, 19, 20, 38-43, 55-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holland et al (4,855,058)(hereinafter '058) in view of Bertelsen et al (US 4,839,037)(hereinafter '37). Reference '058 discloses the process of filtering water in a spiral wound membrane module and tailoring the module to produce a recovery higher than 75 %, and more particularly 90 % (abstract, Figs. 1 and 6, column 9, lines 50-60, and column 10, lines 7-16). Reference '058 discloses changing the dimensions of the feed channel to avoid changes in feed fluid velocity and tailoring the module for a predetermined recovery (column 6, lines 30-68, and column 7, lines 1-14). The specific claimed superficial velocity as claimed in claims 1, and 38 are not disclosed in '058. '058 teaches designing the module depending on desired operation conditions, the reduction in changes in feed velocity are achieve in '058 by providing longer feed flow path by using **tapered spacers** to reduce the distance between membranes progressively to increase downstream flow velocity, or tapering the width of the flow path (column 4, lines 12-25, column 6, lines 47-68, and column 7, lines 1-20).

Based on this teaching, one skilled in the art at the time the invention was made would have been motivated to taper the module or the channels as suggested in '058, in order to obtain a particular recovery and to achieve a particular superficial fluid velocity. Regarding claim 38 reference '058 discloses the membrane as being selected between ultrafiltration, reverse osmosis and microfiltration (column 8, second paragraph).

**Reference '037** teaches a spiral wound module with tapered configuration, with decreasing cross sectional area (Fig.1, 7), the module is designed with a tapered degree to maintain the feed velocity from inlet to outlet by reducing the membrane area from the (inlet), to the bottom (column 6, first and six paragraph, column 5, lines 3-53). The membrane recovery and the surface velocity are also disclosed (Fig. 8, column 6, lines 49-53, and column 7, lines 1-22). It is clear from '037 that the superficial velocity is a function of the feed flow (Fig. 8). It would have been obvious to one skilled in the art at the time the invention was made to design a spiral wound membrane module of '058 with a tapered configuration e.g. by cutting the membrane and spacers with the angle suggested in '037 (column 5, lines 18-50), to maintain the membrane fluid velocity along the length of the feed side, and provide therefore higher recovery with less membrane surface, since both references are directed to produce a module with elimination of changes in feed fluid velocity (see reference '058, column 6, last paragraph). Reference '037 will resolve the problem of providing longer feed fluid path, and produce a constant superficial velocity, as indicated on fig. 8).

Further more, one skilled in the art at the time the invention was made will be able to tailor a tapered spiral membrane module with distinct degrees or tapering and fluid velocity depending on particular requirements, by using the teaching of '037, or a combination of '037 and 058, as discussed above.

As to claims 2 and 39, the recovery was discussed above.

As to claims 3, 40-41, reference '058 discloses the module with the permeability claimed e.g., approximately 0.03 GFD/Psi, however the recovery for a single module is lower than the claimed value (column 10, second paragraph). '058 also suggest providing modules in parallel to achieve the overall conversion capacity (column 4, second paragraph). It would have been obvious to one skilled in the art at the time this invention was made to provide multiple membrane elements in series or parallel to increase the conversion or permeate recovery percentage.

As to claims 4, 39, the harness rejection, e.g. salt rejection, is disclosed as greater than 30 %, e.g. 97.5 (column 9, lines 50-61).

As to claims 5-6 and 40-43, the specific feed side superficial velocity is not disclosed to be within the claimed value, although designing the feed channel to maintain the feed velocity constant through the length of the channel is disclosed (column 6, last paragraph).

As to claims 55-56, they are equivalent to claims 19-21, and the process performance will be based on the feed channel design, as discussed above.

3. Claims 7-16, 21-22, 44, 45, 46, 47, 48, 49, 50, 52, 53, 54, 57, 58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holland et al

(4,855,058)(hereinafter '058) in view of Bertelsen et al (US 4,839,037) as applied to claim 1 and 38 above, and further in view of Shippey et al (3,992,301)(hereinafter '301) and further in view of Uhlinger (6,190,556) (hereinafter '556). Reference '058 fails to disclose the injection of a gas in the feed during the process of using the spiral wound membrane. Reference '301 teach cleaning membrane surfaces by injecting or mixing a gas or air with the feed, and performing chemical cleaning automatically at periodic intervals (column 2, lines 19-67). The membrane is disclosed as spiral wound membrane (column 10, lines 58-68, and columns 11-12, lines 1-5). It would have been obvious to one skilled in the art at the time the invention was made to mix the feed water in line or in a separate step with a gas to provide bubbles that when inside the feed side of the membrane are capable of cleaning the membrane surface, increasing the permeate recovery, as disclosed in '301 (abstract). As to claim 8, collecting the permeate in a holding tank (no illustrate) bladder or accumulator is for further distribution or se is inherent on '301 (column 2, second paragraph), where teaching of conventional collecting and using a portion of the permeate for backwash is disclosed. The tank with control level is not disclosed in reference '058, or '304. '566 teach collecting permeate in a holding tank in a process of filtering water by spiral wound membrane series, the tank is provided with level control means and system for operating the feed pump based on the permeate level in the tank (Figure1, elements 53, 57, 59, 19, 21 and 27). It would have been obvious to one skilled in the art at the time the invention was made to

have a spiral wound membrane designed for a particular recovery ratio and permeability adapted with the tank level control operation suggested in '556.

It would have been obvious to one skilled in the art at the time the invention was made to inject air in the spiral module of '058, since reference '301 suggest the process for cleaning membranes in general and in particular membranes having a core member and membranes at the outer surface thereof (e.g. wrapped around the core).

Regarding to claims 10-13, 14, 15, 16, 21, 22, flushing with a chemical cleaning agent is disclosed in '304 (Fig. 1, element I3). As to claim 12, mixing the chemical by introducing by means of pump Ts3, is disclosed in '304, As to claim 13, the chemical solution is injected or passed to the inlet of the module. As to claim 14 injecting the solution by gravity or other pressure means it would have been obvious to one skilled in the art at the time the invention was made, however a column of the solution generating the pressure to pass the fluid by the fed side will be required.

As to claim 15 no additional inlet other than the feed inlet is disclosed in '304 (Figure, e.g. RO). As to claim 16, membrane provided with tanks above level and accumulator discharging without additional pressure are art recognized features. Regarding claim 44, although reference '304 discloses the process for reverse osmosis apparatus, the same cleaning effect is expected to happen in term of membrane cleaning surface in an ultrafiltration membrane.

***Response to Arguments***

4. Applicant's arguments filed 8/31/05 have been fully considered but they are not persuasive. Applicant argues that a particular velocity is not disclosed in '058 for the particular membrane design. The velocity is a function of the feed flow, and is disclosed as being constant through the membrane length in reference '058. Reference '037 is added as required by the tapered module configuration, which reference clearly teaches how to achieve the claimed velocity (see fig. 8), and discussion above.

***Conclusion***

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ana M. Fortuna whose telephone number is (571) 272-1141. The examiner can normally be reached on 9:30-6:00 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wanda L. Walker can be reached on (571) 272-1151. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Ana M Fortuna  
Primary Examiner  
Art Unit 1723

AF  
November 08, 2005